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INTERNAL AND EXTERNAL STATISTICAL NEEDS OF AMERICAN BUSINESS.*

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A foreword of explanation seems appropriate. I shall not attempt to define the oft-used term "business statistics," nor to draw a strict line of demarcation between accounting and statistics—leaving the matter of precise definition and fine distinctions to our academic friends. I shall simply describe conditions and suggest some broad, and perhaps bold, ideas for improvement in the existing order of things.

In approaching the subject of the statistical needs of American business, "business statistics" seemed to divide logically into two categories, internal and external: "*internal*" comprising the statistics compiled by private enterprises for their own direct benefit, *i. e.*, the analysis of a company's own business and data related thereto; and "*external*" comprising statistics compiled by others, such as (1) business indices and barometers, and (2) governmental statistics for general consumption.

INTERNAL NEEDS

Extent of private statistical work:

Under internal needs let us first look at the extent of private statistical work.

It is difficult to determine, even roughly, the amount and character of statistical work done by business concerns, chiefly for two reasons: *first*, it is so varied and often so closely related to regular accounting work, and *second*, no community of interests has existed among those engaged in such work. But we

* Paper read at the seventy-ninth Annual Meeting of the American Statistical Association.

know that there are thousands of large and small business concerns, including public utility corporations, manufacturing and mining industries, wholesale and retail mercantile firms, and financial institutions, which are engaged in statistical work of more or less importance. The most common and best known types of such work are cost accounting studies and analyses of production and sales, since these were the first statistical offshoots from regular accounting work. Also, we should not forget the statistical compilations of trade journals and business associations, and those of private commercial agencies, such as Bradstreet, Dun, Babson, Brookmire, etc.

Statistical data appearing in trade journals and financial papers have grown tremendously in the past few years. A recent survey found over 300 different topics or sets of figures—appearing in over twice as many publications—the same data often appearing in a half-dozen papers or so. Indeed, we only need look at our daily newspapers to realize that the American people are relying more and more on facts as bases for opinions and arguments. Possibly we occasionally attempt to prove too much rather than too little by statistics, especially since much of the product is by no means scientifically correct.

Causes of rapid development of private statistical work:

Three factors appear to have been largely responsible for the rapid development of private statistical work during the last 10 or 15 years:

1. The evolution from small to large business undertakings (industrial combinations).
2. The increase in legislation affecting business, especially public utilities.
3. Progress in the manufacture of mechanical labor-saving devices for accounting and statistical work.

The centralization of administrative policy and control in many lines of industry has made necessary more data and derivative figures than mere corporate accounting affords.

The creation of federal, state and municipal regulatory and investigating bodies has forced statistical development on a large scale among public utility and industrial concerns. Questions involving the amount and character of business,

the cost of production, prices or charges for service, etc., must be studied through the medium of statistics by such investigating and regulatory bodies as well as by the owners and managers. Compensation commissions also need and require much information from the industries within their jurisdiction; and workmen's compensation laws and other employees' disability benefit plans have made it necessary for all large employers of labor to have a knowledge of, and often to undertake their own, statistical work. In short, the requirements now laid on business by governmental bodies can be adequately met only when full statistical records are kept currently.

Mechanical devices have made it possible for private concerns to make statistical compilations and investigations which were formerly prohibitive from the standpoint both of cost and of time.

That business throughout the country still needs to know more about itself is evidenced by a recent statement by the Chairman of the U. S. Federal Trade Commission, who said: "A large proportion of the business men of the country do not know their costs; nine out of ten establishments making several products cannot separate the sales; of 60,000 large corporations, one-half do not charge off a single penny for depreciation." A member of one of the committees of the Council of National Defense stated the other day that if American business had kept better records, the work of the Council would have been greatly simplified and accelerated.

Future needs:

That, in the future, statistical requirements will increase rather than diminish seems certain. The past decade has witnessed many changes in the political, social and industrial life of the nation; but the next few years promise even greater, perhaps revolutionary changes. Statistics will be required as never before by those in high places, both in business and in governmental affairs, as a guide to the right solution of the questions of the day. The statistician will be called upon to furnish these data properly analyzed and correlated.

At the present time much of the statistical work of private

corporations is being done by poorly equipped persons. In many cases the work is done by persons drafted from the accounting and clerical forces; and in some cases the work is carried on merely in conjunction with bookkeeping and accounting work. There are only a few *experienced* men, and practically no *technically* trained workers, now available. The demand for properly trained as well as experienced men to do accurate, scientific work is far greater than the supply. Hardly a month passes without a request coming to our office for a bright young man who can make statistical analyses and illustrate the results graphically. We are also constantly besieged by men and women, young and old, begging assistance on how to conduct statistical investigations which have been called for by their employers. These persons usually have no conception of the theory or method of statistical procedure, and are apt to be poorly equipped mathematically.

The lack of properly trained men is chiefly the result of the lack of adequate training facilities in our educational institutions. I believe I am safe in saying that nowhere in this country is there offered a thoroughly comprehensive course in the theory and method of statistics *coupled with practical application*. The main deficiency in existing courses lies in the inability to teach the application of theory and method by actual laboratory work on real problems and investigations, especially problems and investigations relating to business. Although admitting that the science *is* difficult to teach, we cannot concede that it is impossible to have more effective instruction in the future, *provided* the experience of those now engaged in private statistical work is utilized. Here let me suggest that it would be a good plan for our academic friends to alternate their teaching semesters with actual work in both the private and governmental statistical fields.

Is it not a proper function of the American Statistical Association to foster and promote higher education in statistics? Indeed, I am not so sure but that it would be a good plan to introduce elementary courses in statistics and graphics in the primary and secondary grades of our public school systems. Why should there not be a standing committee in the Association whose duty would be to take the initiative in assisting

Boards. The efficiency of economic mobilization seemed threatened; that was a more serious matter than the waste of public funds. The men who were most keenly aware of the lack of coördination in statistical work now had a strong talking point. Steps were presently taken to remedy a fault which had been patent for a generation or more on a peace basis. The head of the Division of Planning and Statistics of the Shipping Board was put in charge of the Bureau of Research of the War Trade Board, and then of the Division of Planning and Statistics of the War Industries Board. Thus three of the new statistical agencies were brought under a single direction. Later the same man became chairman of the Statistical Committee of the Department of Labor, and finally he was authorized to form a Central Bureau of Planning and Statistics. The Central Bureau set up a clearing house of statistical activities, appointed contact men to keep touch with the statistical work of all the War Boards and certain of the old departments, and began to supervise the issuing of questionnaires. When the armistice was signed we were in a fair way to develop for the first time a systematic organization of federal statistics.

For the first few weeks after the fighting stopped, it seemed as if what had been gained in statistical organization might be lost almost at once. The rapid demobilization of the War Boards threatened to sweep with it their statistical bureaus, or to scatter the new statistical bureaus among the old departments and leave us again in statistical confusion—making figures in abundance but having no general statistical plan. But at a critical moment President Wilson approved a plan by which the Central Bureau of Planning and statistics was made the single statistical agency to serve the American conferees at the Peace Table. Thus, the Central Bureau was granted a reprieve for some months. It still remains to be seen whether this bureau or some successor serving the same centralizing functions will be made permanent.

II.

In speaking next of our hopes for the future, I am speaking merely as one member of the American Statistical Association.

the academic and governmental field of statistical activities. May I suggest that it is time for the Association to awaken to a fuller realization of the fact that the compilation and interpretation of facts now attends, or should attend, all important business undertakings, and that the field of statistical accomplishment no longer lies exclusively in institutions of learning and governmental bureaus. In other words, business is trying to put the theories of the academicians into actual practice, but is not getting the assistance it needs from them in return. Indeed, some of the most helpful and illuminating current thought on the science appears not in the American Statistical Association publications, but in the publications of other scientific associations.

EXTERNAL NEEDS

Before considering the needs that lie entirely outside of the field of private activities, I want to call attention to a phase of business statistical work quite different from that which I have already mentioned. It is this: Industrial and commercial enterprises are being vitally affected by the results of statistical studies, inquiries and investigations made by government bureaus and commissions—and by private organizations and individuals—of varying degrees of competence.

Business interests have, for the most part, been too prone to accept meekly the statistical results by which they have been judged; and too often they have replied in non-statistical terms or by general denials. This situation is wrong. Business should take part in these studies and results, not with a view to concealing or distorting facts, but in a spirit of coöperation and mutual helpfulness and seeking after the truth. We must remember that statistics have a large potential value in shaping public opinion, and that this is true also if the statistics are faulty but are not refuted. Agitators and enthusiasts are constantly appearing before legislative bodies with extravagant claims and ridiculous data. In these cases it is the duty of the interest affected to meet such misstatements with a presentation of the *facts*. But this cannot be done unless business secure competent statisticians, and where are they to be found in sufficient numbers?

Let us now look at some external statistical needs of business from the standpoint of *existing material*, and *additional data and treatment needed*, remembering that we have already divided this part of the discussion into two main categories: (1) statistics relating purely to business, and (2) governmental statistics for general consumption. The speaker may perhaps be excused if he indulges in criticism of governmental statistical work because of his former association therewith.

Business—existing material:

Only a few years ago one or two sets of figures, *e. g.*, railroad earnings or bank clearings, were considered sufficient to indicate the condition and trend of business in general. As commercial and industrial life expanded and became more complex, both at home and abroad, however, it became necessary to consider more factors to secure the desired present and future vision; and then we began to have trouble in comparing one factor with another and in giving each its proper weight in our mental calculations. We find that we need a *composite* result, but here we are confronted with many difficulties. What factors or items shall be selected? What method of combining and weighting, if any, shall be used? What base shall we take against which to measure changes? What shall be done with seasonal and cyclical trends? Before we have gone far into the consideration of these questions, we discover the phenomenon of business cycles and find the solution of our problem still more difficult.

Babson's and Brookmire's statistical charts and services have attempted to solve these problems, and Mitchell has given us some wonderfully illuminating data in his study on 'business cycles. While in no way depreciating the efforts of Babson, Brookmire, or Mitchell—for they have done pioneer work—nevertheless, we are forced to the conclusion that the results given us rest largely on a basis of *judgment* of the compilers, and that these perplexing problems can only be solved by additional research and analyses.

Babson and Brookmire differ as to the factors selected, method of combining and theory. Babson does not eliminate cyclical trend, but computes and shows it as the XY line in

his composite plot. It is only fair to state, however, that Babson has recently been issuing a series of charts that does eliminate growth. Brookmire, on the other hand, computes and eliminates the cyclical trend and shows a horizontal "normal" line OP. Who shall say which is right?

Thanks to Persons (Harvard) and King (West Va.), we now have some light on some of these matters. In a most admirable study, Persons tested, by means of the Pearsonian coefficient of correlation, the significance of 25 items or series generally used as business indices, and found nine whose fluctuations are *concurrent* and which are therefore proper to use in constructing a business barometer, and five whose fluctuations *precede* those of the nine and which are therefore useful in forecasting business changes.* It should be noted here that Persons' study was based on *annual* data, and, as the author states, further investigation based on quarterly and monthly observations is necessary to reach final conclusions.

Similarly King tested, by the same method, some of Mitchell's conclusions regarding cyclical movements of certain price series. His analysis supports Mitchell in some conclusions, but differs in others.† Here again *annual* data are shown not to be sufficient for the final and conclusive test to which Mitchell and King have but pointed the way.

Business—additional data and treatment needed:

It appears that the compilations of basic data, especially data used as business indices, are fairly ample;‡ and, furthermore, there is no evidence but that these compilations, in general, are sufficiently well made to serve all practical purposes. But American business interests, and the government as well, need a properly constructed, comprehensive business barometer, or a series of barometers, and a business forecast, if it is possible to construct them. Whether the construction

* The nine concurrent items are—railroad gross receipts, railroad net receipts, coal production, exports, imports, pig iron production, price of pig iron, immigration, and wholesale prices. The five preceding items are—sales on New York Stock Exchange, price of same, bank clearings (corrected), new railroad mileage, and business failures. See The American Economic Review, December, 1916.

† See The Quarterly Journal of Economics, August, 1917.

‡ At least one possible exception to the sufficiency of available data should be noted: *i. e.*, U. S. Post Office receipts. They were published for a selected number of large cities up to a few years ago. Their publication should be resumed.

of such a barometer and forecast is a proper government function, or is one that should be left to private initiative, is a question that can not be intelligently answered until we have further light on the subject. And it is here that the government can do a constructive piece of work for American business. The vast amount of mathematical and research work necessary before we can reach a proper solution of the difficulties that attend these statistical problems is too much for private enterprise to undertake at present. The government ought, at least, to continue the studies of Persons, King and Mitchell.

The idea of a governmental index of this kind is not a new one. About 1907, the French government appointed a commission, composed of governmental officials, bankers, statisticians and economists, to study the possibility of constructing one or more general business indices. The commission reported that certain factors or series could be used; but a composite business barometer was not constructed.*

Right in line with work of this character, Dr. Hoffman has recently proposed weekly or monthly government index numbers of national health and social well-being, including index numbers of—

The general urban death rate
The sickness rate in industry
The accident rate in industry
Number of arrests in large cities
City expenditures for poor relief
Ratio of unemployment.

He also suggested that possibly all these index numbers could be combined into one general index for the entire country,† and pointed out that comparatively few new data would need to be collected. The speaker heartily seconds Dr. Hoffman's suggestion. It is this kind of work, especially the accident and sickness rates in industry and the unemployment ratios, that the business interests of the country need—something concrete and up-to-date.‡

* Cf. Persons' article in *The American Economic Review*, December, 1916.

† See *Economic World*, July 7, 1917.

‡ Evidently as an outgrowth of Dr. Hoffman's suggestion, the Bureau of the Census has recently begun the publication of a *Weekly Health Index*. It is a step in the right direction, but the results thus far are not all that could be desired.

Governmental—existing material:

The amount of data collected annually, quinquennially, and decennially by our government is enormous and covers practically the entire range of human activities, *except* the field of wholesale and retail trade, and the distribution of the wealth and income of our people. Indeed, this country takes first rank among the nations of the world in the amount and the frequency of statistics gathered and published. To one familiar with governmental statistical activities, their bulk is appalling, and one is prompted to ask, Is it all necessary and serving a useful purpose? I am inclined to believe that it is not so much a question of over production as one of poor production, poor in the sense of lacking coördination, correlation and interpretation. In other words, it is not sufficiently digested before given to the public.

Governmental—additional data and treatment needed:

It would hardly seem that we could possibly need any more government statistics; but we do. We need *annual* production figures for both manufactures and agriculture. Our five-year censuses of manufactures no longer suffice to show the rapid industrial changes which are taking place in this country. If this present world war terminates by 1920 and if conditions are then restored to anywhere near a normal or pre-war basis, the tremendous expansion and change in the complexion of American industries due to the war will be completely lost in the federal statistics. We also need better industry classifications, details on kind and quantity for more products, and classified wage schedules of industrial workers.

The annual farm production estimates of the Department of Agriculture serve in a measure to fill the gap between the ten-year agricultural Census enumerations; but either these estimates should be further improved, or else a limited annual production census should be taken by the Census Bureau. Government statistical work, in general, has been conducted too much from the standpoint of history. We need *current* facts to guide administrative and legislative policies in affairs, both public and private.

But even more important than additional data is the need for coördination of present governmental statistical work and for better analysis and correlation of the results of this work. The following will illustrate:

(a) We have historical statistics on population and agriculture, but where is there a comprehensive study correlating the two? Present world conditions have served to revive interest in the Malthusian theory, but do we yet know the facts?

(b) The Census gives us an estimate of the wealth of the country every 10 years, but where, *except* in Wilford I. King's recent work, is there any attempt at scientific analysis of the sources and distribution of wealth, and the amount of the national income and savings therefrom?*

(c) The Bureau of Labor Statistics publishes data on relative prices and wages, but where is there a composite index of the increased cost of living in various localities and occupations, *except* a few general studies like Rubinow's? This is a vital question in present wage controversies, but we have practically no conclusive data.

(d) The Census publishes figures on domestic production by industries, and another bureau the statistics of our foreign commerce; but, on account of the differences in classification, etc., it is not possible to compare one with the other to any great extent. Again, where are there any official figures on the effect of higher prices on the money aggregate by which we measure our foreign and domestic trade? What about the actual volume?

(e) The Department of Agriculture recently gave us an annual estimate of \$21,000,000,000 of farm products, but did it tell us that the total includes billions of duplications due to the feeding of crops to live stock, or an estimate of the amount of this duplication?

(f) Why do we not have a complete monthly government index, or catalog, of the mass of material which the various

* During the past few months we have witnessed the efforts of government officials and others to prove that our national resources are ample to meet huge war costs, and practically the only figures available were King's and how they have been misinterpreted and misused! We glibly quote \$250,000,000,000 of wealth, but how much is fixed and how much is liquid? It is well to remember that fixed capital is of use to the government only as a going concern.

departments and bureaus gather, compile and publish? Much valuable information never reaches business concerns because they do not know that it exists.

(g) Congress has appropriated \$20,000,000,000 for the conduct of war, but what governmental agency has compiled a comprehensive budget showing sources of income, character of expenditures, methods of financing, etc.? The only intelligent statements have come from some of the New York City financial institutions.

(h) Upon the vital question of the division of income between capital and labor, where have we any helpful official studies of a late date?

These are only a few examples of where and how our present governmental activities fall short of giving American business the statistical information it needs and *pays for*; they could be extended *ad libitum*.

Further proof of the lack of coördination and proper analysis of our official statistics is found in the administrative conduct of the present war, so far as the determination of facts upon which to base executive action and policy is concerned. One would naturally suppose that the newly created war bodies, such as the Shipping Board, the Food and Fuel Administrations, the Export and Priority Boards, the Council of National Defense, etc., would turn to existing statistical bureaus for most, if not all, of their information. Apparently they have not done so to any great extent; on the contrary, they have felt it necessary to largely conduct their own investigations and studies. The speaker was surprised to learn, upon a recent visit to Washington, that the Census Bureau (the largest statistical office in the world) is not now, nor has it been, engaged to any extent on war work, but is pursuing the even tenor of its ways on peace-time investigations which might well be suspended so that the entire staff of the Bureau could be released for use in conducting war investigations and preparing war compilations.*

* It is recognized that much of the war work is specialized and should be done in the respective organizations or close thereto. But the personnel and equipment of the Census Bureau should be utilized somehow, even if it be necessary to temporarily transfer some of its units to war offices. In this connection, it is suggested that 5,000 employees might be found in the various departments at Washington who could be transferred to direct war work for which there is a dearth of workers.

Is not this condition a sad commentary on the insufficiency of the statistical product of our permanent bureaus in Washington? Does it not indicate that they have failed to measure up to the demand for current concise facts, or, at least are lacking in vision and initiative?

We have been spending millions of dollars annually for governmental statistics which have inadequately met the current needs of the business interests of the country and have failed the government itself in a war emergency. What is the remedy? How can the mass of statistical data collected by the government be vitalized and made more useful? The only answer seems to be the establishment of an *independent* government bureau of statistical administration, research and analysis, which would not be a part of any existing government department or statistical office. Such a bureau should be provided with the best expert statisticians and economists the country affords. Their tenure of office should be so limited as to keep the bureau alive and progressive, and their appointments arranged to insure continuity of work. The commercial, industrial and labor interests of the country might well be represented also. Indeed, I suggest that nominations for the commissioners in such a bureau be made by popular vote at the annual meetings of the American Statistical and Economic Associations, and that the U. S. Chamber of Commerce and the American Federation of Labor, respectively, make nominations for the representatives of commerce, industry and labor. Let the scope of the work of the bureau be worthy of the best thought and experience of the men most distinguished in their respective callings, so that it would be a crowning achievement and highest honor to have been chosen to direct, or to participate in, the work. Moreover, in addition to the functions already indicated, such a bureau should be a central clearing house on all official statistical matters, and should exercise a stimulating and supervisory oversight on the work of the various departmental bureaus. It should also promote international statistical studies and comparisons—a function that will be especially important during the reconstruction period following the war.* Congress

*“The Office of National and International Statistics” might be an appropriate name for the new bureau.

needs to be supplied with a large volume of convincing facts; both old and new war bureaus and boards must have adequate statistical information for the conduct of their work; and business of the country is relying more and more on specialized and general statistics in this period of war adjustments. There is plenty of work for the new bureau to do.

To the intelligent and liberal use of statistics, must be credited much of England's remarkable success in creating her wonderful war machine and in organizing the resources of the nation back of it. Our English cousins have perhaps a keener appreciation of the value of statistics, especially in war work, than have we Americans.*

Now would seem to be a propitious time to secure the necessary legislative action for the establishment of the proposed new statistical bureau. I believe that if the scientific bodies gathered in this city this week were to get behind such a project and were to join with the Chamber of Commerce of the United States, the creation of the bureau could be accomplished during the present session of Congress. Here is another opportunity for the American Statistical Association to do a constructive piece of work, and take the leadership in advancing statistical science in this country. Will it seize it, or will it continue to be largely a debating and mutual admiration society?

Recapitulation:

(1) *Internally* American business needs more and better equipped men to do its statistical work, and suggests that the American Statistical Association foster and promote higher education in statistics and encourage the publication of adequate text books.

(2) *Externally* American business needs, principally, three things:

(a) Further studies, by the government, on the construction of business barometers and forecasts and the establishment of certain indices relating to social well-being.

* Sir Eric Geddes has a penchant for statistics. In a recent interview he said: "I statistize everything. Knowledge is power and statistics are the throttle valves of every business. But don't let statistics master you—use them."

(b) Annual official production figures on manufactures and agriculture; a revision of industry classifications; details of kind and quantity for more products; and classified wage schedules for industrial workers.

(c) Better coördination of existing government statistical work, and correlation and scientific analysis of the material now collected and published.

Business also urges the creation of an *independent* federal bureau, manned by the best experts the country affords, to the end that government statistics may be vitalized and made more useful, the establishment of this bureau to be accomplished by the American Statistical Association joining with other scientific bodies in securing the necessary legislation during this session of Congress.

President Wilson has truly said, "Facts are our masters now." But, gentlemen of this Association, are we masters of the facts? I fear we have far, very far to go before we can answer in the affirmative.